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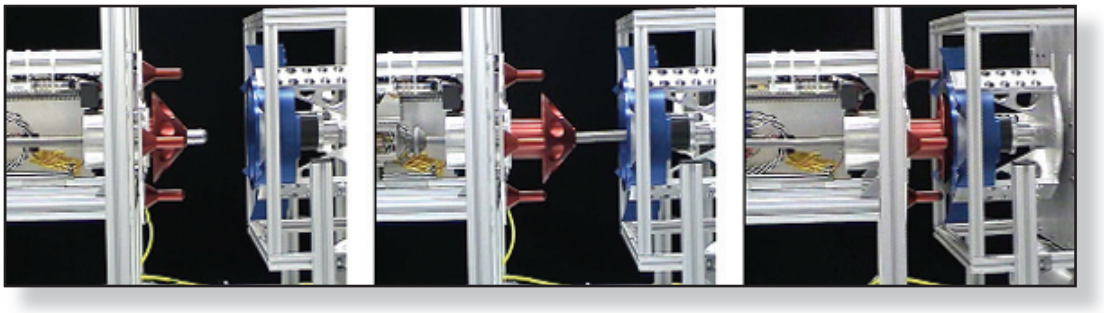
Science and Technology for Tomorrow's Air and Space Force

Air Force SBIR/STTR

Success Story

AUTONOMOUS SATELLITE DOCKING MECHANISM DEVELOPED FOR ON-ORBIT SERVICING



The Space Vehicles Directorate; Microcosm, Inc.; and Michigan Aerospace Corporation developed the autonomous satellite docking mechanism under a Small Business Innovation Research Phase II enhancement. The mechanism is an enabling technology for future on-orbit servicing systems. In addition, it is a potential alternative for future Orbital Express missions, which will provide additional options for military and commercial customers.

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Accomplishment

Current satellite systems require years to design, build, and launch. After launch, it is nearly impossible to repair, upgrade, or reconfigure the satellite. The directorate; Microcosm, Inc.; and Michigan Aerospace Corporation have taken a step to solve this problem through the development of an autonomous satellite docking mechanism. The docking mechanism was put to the test on the National Aeronautics and Space Administration's KC-135 microgravity research aircraft. The mechanism successfully completed 62 different docking operations on four 2-hour flights.

The docking mechanism utilizes a flexible cable to initially contact and capture the target vehicle with a minimum of imparted force, a procedure known as soft-docking. The cable is then retracted to bring the satellites into a hard-dock state. Finally, the mechanism locks in place, maintaining a rigid mechanical connection that will permit fluid transfer and refueling, power and data exchange, and physical component replacement.

Background

The capability to autonomously service spacecraft while on orbit has enormous potential for revolutionizing how spacecraft are designed, fielded, utilized, and operated in the future. The capability to upgrade hardware on existing satellites and to maintain, repair, or refuel others provides flexibility that will be key to maintaining US space dominance. In addition, this flexibility will be critical in ensuring operationally responsive space. Military systems must be responsive to changing requirements even after the systems have been launched. On-orbit servicing and assembly is an excellent candidate because satellites could be upgraded or reconfigured in a fraction of the time it would take to design, build, and launch a new satellite.

Space Vehicles
Technology Transfer

Additional Information

To receive more information about this or other activities in the Air Force Research Laboratory, contact TECH CONNECT, AFRL/XPTC, (800) 203-6451 and you will be directed to the appropriate laboratory expert. (04-VS-21)